What is Claimed Is:

1. A method for drilling micro-holes in a multi-layer substrate including a first metal layer and at least one second metal layer, and including a dielectric layer arranged between two metal layers, comprising:

irradiating, with an energy beam of a solid-state laser having a repetition frequency of at least 10 kHz, a wavelength of less than 1100 nm and a pulse length of less than 50 ns, the irradiation being carried out in two operations including,

ablating, in the first operation, the first metal layer and a part of the underlying dielectric layer , and,

ablating, in the second operation, the dielectric layer cleanly down to the second metal layer, wherein, in the first operation, the laser beam is set to a repetition frequency of at least 15 kHz, focused onto the first metal layer and moved with a first circumferential velocity in a circle corresponding to the diameter of the desired hole, in such a number of passes until at least the first metal layer is cut through, the metal layer being fully removed in the hole region, and in the second operation, the laser beam is set to a repetition rate at most equal to that in the first operation, directed out of focus onto the dielectric layer exposed in the hole and moved, with a circumferential velocity which is higher than the first, in at least one concentric circle inside the desired hole diameter, in such a number of passes until the dielectric layer is ablated in the hole region, the defocusing and the second velocity being set such that the effective energy density in the second operation lies below the threshold for ablation of the second metal layer.

2. The method as claimed in claim 1, wherein the laser is a neodymium vanadate laser having a wavelength of 355 nm.

3. The method as claimed in claim 1, wherein the laser is a neodymium vanadate laser having a wavelength of 532 nm.

4. The method as claimed in claim 1, wherein the repetition frequency in the first operation is set between about 15 kHz and about 40 kHz and, in the second operation, between about 10 kHz and 20 kHz, the repetition frequency in the second operation always being at most equal to that in the first operation.

5. The method as claimed in claim 2, wherein the repetition frequency in the first operation is set between about 15 kHz and about 40 kHz and, in the second operation, between about 10 kHz and 20 kHz, the repetition frequency in the second operation always being at most equal to that in the first operation.

6. The method as claimed in claim 1, wherein the repetition frequency is set to 15 kHz in both operations.

7. The method as claimed in claim 1, wherein the circumferential velocity of the laser beam in the first operation is between 200 and 300 mm/s and, in the second operation, between 200 and 600 mm/s.

8. The method of claim 7, wherein the circumferential velocity is set higher in the second operation than in the first operation.

9. The method as claimed in claim 1, wherein the circumferential velocity in the second operation is higher than 600 mm/s.

10. The method of claim 9, wherein the circumferential velocity is set higher in the second operation than in the first operation.

11. The method as claimed in claim 1, wherein, for a desired hole diameter > 150 μm, an additional circle of laser pulses is directed in the first operation onto the region inside the circle described by the laser beam.

12. The method as claimed in claim 1, wherein the first operation is firstly performed for all the holes of a processing region, and wherein the laser setting is then modified and the second operation is carried out for all the holes of the region.

13. A method for drilling micro-holes in a multi-layer substrate including a first metal layer and at least one second metal layer, and including a dielectric layer in each case arranged between two metal layers comprising:

irradiating, with an energy beam of a solid-state laser having a repetition frequency of at least 10 kHz, a wavelength of less than 1100 nm and a pulse length of less than 50 ns, the irradiation being carried out in two operations including,

ablating in the first operation, the first metal layer and a part of the underlying dielectric layer, and,

ablating in the second operation, the dielectric layer cleanly down to the second metal layer, wherein, in the first operation, the laser beam is set to a repetition frequency of at least 15 kHz, focused onto the first metal layer and moved with a first circumferential velocity in a circle corresponding to the diameter of the desired hole, in such a number of passes until at least the first metal layer is cut through, the metal layer being fully removed in the hole region, and in the second operation, the laser beam is set to a repetition rate at most equal to that in the first operation, and centrally directed onto the dielectric layer exposed in the hole, the beam being defocused in such a way that the spot irradiated by it is at least as large as the area of the hole to be drilled, such that the hole cut out of the metal layer in the first operation acts as a mask.

14. The method as claimed in claim 13, wherein the laser is a neodymium vanadate laser having a wavelength of 532 nm.

15. The method as claimed in claim 13, wherein the repetition frequency in the first operation is set between about 15 kHz and about 40 kHz and, in the second operation, between about 10 kHz and 20 kHz, the repetition frequency in the second operation always being at most equal to that in the first operation.

16. The method as claimed in claim 13, wherein the repetition frequency is set to 15 kHz in both operations.

17. The method as claimed in claim 14, wherein the repetition frequency in the first operation is set between about 15 kHz and about 40 kHz and, in the second operation, between about 10 kHz and 20 kHz, the repetition frequency in the second operation always being at most equal to that in the first operation.

18. The method as claimed in claim 14, wherein the repetition frequency is set to 15 kHz in both operations.